APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-445/92-13
50-446/92-13

Unit 1 Operating License: NPF-87
Unit 2 Construction Permit: CPPR-127
Expiration Date: August 1, 1992

Licensee: TU Electric
Skyway Tower
400 North Olive Street
Lock Box 81
Dallas, Texas 75201

Facility Name: Comanche Peak Steam Electric Station (CPSES), Units 1 and 2

Inspection At: Glen Rose, Texas

Inspection Conducted: April 13-17, 1992

Inspectors: T. M. Latta, Resident Inspector
A. C. Cerne, Resident Inspector
V. G. Gaddy, Resident Intern
M. F. Runyan, Reactor Inspector

Reviewed by: L A Yandell 5/19/92
L. A. Yandell, Chief, Project Section B Date
Division of Reactor Projects

Inspection Summary

Inspection Conducted April 13-17, 1992 (Report 50-446/92-13)

Areas Inspected: Routine, announced special inspection of the Unit 1 Postconstruction Hardware Validation Program (PCHVP) results, which were applied as lessons learned to Unit 2 construction completion programs.

Results: Within the areas examined, no deficiencies were identified. In general, the documentation reviews and assessments which were performed relative to safety-related systems, structures, and components indicated that the licensee's process for the translation of Unit 1 PCHVP results to Unit 2 programs were well established and effectively implemented and that they were commensurate with the methodologies utilized for Unit 1. Strong management involvement and support were evident as indicated by the thoroughness of the documented records associated with the attribute evaluation forms which were reviewed and the sound technical justifications, which were incorporated into the Unit 2 design validation programs.

Three observations were identified. The first observation involved the licensee's reliance on Unit 1 PCHVP results for radial weld shrinkage in deference to performing a selected sample of Unit 2 piping welds with the most potential for base metal shrinkage due to multiple weld repairs (paragraph 2.1.2). The second observation concerned the lack of specific procedural guidance for establishing the minimum sample size or threshold necessary to develop statistical conclusions (paragraph 2.2.1). The third observation pertained to the relatively large number of outstanding design changes associated with the specification for control room board design (paragraph 2.4.1).

Inspection Conducted April 13-17, 1992 (Report 50-445/92-13)

Areas Inspected: No inspection activities were conducted on Unit 1.

Results: Not applicable.

DETAILS

1. PERSONS CONTACTED

TU ELECTRIC

G. Ashley, Project Engineering/Civil
R. W. Braddy, Unit 2 Project Engineering Manager
H. D. Bruner, Senior Vice President
H. M. Carmichael, Unit 2 Engineering Assurance Manager
J. Conly, Licensing Engineer
E. P. Gully, Unit 2 Engineering Management
S. W. Harrison, Manager, Unit 2 Project Overview
T. A. Hope, Unit 2 Licensing Manager
D. Pendleton, Unit 2 Regulatory Services Manager
C. W. Rau, Unit 2 Project Manager
D. L. Raustrom, Construction Quality Engineering Supervisor
D. Rewinkel, Assistant Project Engineering/Civil
R. Scavatto, Electrical Engineering Supervisor
W. Syfrett, Senior Engineering/Plant Engineering
R. D. Walker, Manager of Nuclear Licensing

CITIZENS ASSOCIATION FOR SOUND ENERGY (CASE)
O. L. Thero, Consultant

In addition to the above personnel, the inspectors held discussions with various engineering, technical support, and administrative members of the licensee's staff.

Also present at the exit interview were: L. A. Yandell, Chief, Project Section B, Division of Reactor Projects; and D. N. Graves, Senior Resident Inspector.

2. UNIT 2 DESIGN ATTRIBUTE VERIFICATION INSPECTION (92720, 37055)

The purpose of this special inspection was to evaluate the licensee's implementation of the translation of Unit 1 reverification requirements to Unit 2 as committed to in the CPSES Corrective Action Program (CAP). The inspection focused on the evaluation of the acceptability of the Unit 1 PCHVP results which were applied to Unit 2 construction completion programs. Specifically, the PCHVP represented the portion of the licensee's CAP which verified that safety-related systems, structures, and components were in compliance with the validated design requirements. This process was accomplished for Unit 1 by identifying the final acceptance attributes for safety-related hardware and validating that those attributes satisfied the appropriate design requirements. The input to PCHVP, as implemented for Unit 1, was contained in the installation specifications which incorporated the licensing commitments and design criteria of the design basis documents.

The final acceptance installation requirements identified in the validated installation specifications were used to develop the PCHVP Commodity Attribute Matrix (CAM) for Unit 1 as a set of final acceptance attributes identified for installed hardware. The programmatic aspects of the Unit 1 PCHVP, which utilized either physical validations or engineering evaluation methodologies to ensure that each of the attributes defined in the CAM were confirmed, were evaluated and accepted for Unit 1 in NUREG-0797, Supplement 20. Additionally, the implementation aspects of the Unit 1 PCHVP process were extensively evaluated and accepted as previously documented in NRC Inspection Reports 50-445/89-14; 50-446/89-14, 50-445/89-28; 50-446/89-28, and 50-445/89-61; 50-446/89-61.

With respect to the Unit 2 PCHVP process, which is defined in Procedure 2EP-2.04, Revision 1, "Evaluating Unit 1 Post-Construction Hardware Validation (PCHVP) Results for Applicability to Unit 2," the licensee developed the basis for identifying required field verifications of the items identified on the Unit 2 Attribute Analysis Matrix PCHVP-CAM-002, Revision 4. Additionally, as described in TU Electric's letter, TXX-88373, dated April 14, 1988, Unit 2 specifications were developed using the validated criteria and "lessons learned" identified during the completion of Unit 1.

As previously documented in NRC Inspection Report 50-445/90-35; 50-446/90-35, the programmatic aspects of the translation of Unit 1 reverification requirements, including the development of appropriate specification requirements, were evaluated. As concluded in this report, the methodologies and approach for the Unit 2 design process were found to be consistent with those used for Unit 1 design validation as reflected in the Unit 2 CAM.

Based on the acceptability of the programmatic aspects of the translation of Unit 1 PCHVP results to Unit 2 activities, the inspection team examined the implementation portion of this program. Specifically, the inspection team selected a sample of 227 attributes from the Unit 2 CAM total population of 1841 attributes in order to evaluate the technical justifications for not performing additional PCHVP reinspections of Unit 2 safety-related systems, structures, and components. This sample, which included attributes from the civil/structural, mechanical, electrical, and instrumentation and control disciplines, was predicated on the selection of items which required some level of reinspection on Unit 1 but were classified on the Unit 2 CAM as not requiring reinspection under the auspices of the PCHVP. Based on these attribute selections, assessments were performed within each of the major discipline areas.

2.1 Mechanical Attributes

Within the mechanical area, the inspectors reviewed 70 Unit 1 PCHVP final acceptance attributes for applicability to Unit 2 construction, specification, and verification processes. The specific attributes which were evaluated are identified in Attachment A of this inspection report. These attributes represented a varied sample of quality criteria which affected a wide range of

mechanical hardware, including piping, pipe supports, heating, ventilation, and air-conditioning (HVAC), fire protection equipment, in-core instrument tubing, and installed components.

The inspectors also reviewed the licensee's technical evaluations which documented the rational justification for not performing specific Unit 2 reverification activities. During this review, the inspectors examined various supporting specifications, procedures, and documentation which delineated the technical requirements and engineering criteria used by the licensee to establish that reverification of certain Unit 2 attributes was not required. Some of the documents reviewed contain generic guidance which were evaluated by the inspectors, not only for compliance with the licensee's assessment methodology prescribed by Procedure 2EP-2.04, but also for general conformance to committed codes and standards (e.g., the ASME Boiler and Pressure Vessel Code, Section III) and specific corrective action recommendations. A listing of the specifications and procedures which were reviewed, in part, to verify that Unit 2 work requirements were consistent with the documented technical evaluations and attribute dispositions, is provided in Attachment B of this inspection report.

As a result of these reviews, the inspectors determined that the licensee's engineering organization utilized a conservative approach to the analysis of attributes and that the hardware validation activities for Unit 2 were generally consistent with the PCHVP methodologies utilized for Unit 1. As determined by the inspectors during this review process, the Unit 2 safety-related and seismic Category I HVAC ductwork and supports were replaced with new material and were installed in accordance with revised design criteria (reference Specification CPES-H-2019), while the nonsafety HVAC supports were reinspected to criteria consistent with the seismic adequacy evaluations and Category II/I walkdown criteria delineated in the Procedure EQE Engineering Document No. 52060-P-002. Additionally, the reverification of pipe support attributes was confirmed by the inspectors to be controlled by normal inspection programs and processes. Specifically, the Unit 2 "existing supports" were placed in an in-process status requiring backfit inspections, while "new/modified supports" were inspected initially to the updated design/installation criteria. Installation and inspection requirements for both of these categories of supports were provided in Specification CPES-P-2018, which also delineated the technical requirements applicable to separate attributes which were identified for each of these two support categories. The inspectors also determined that, even though the Unit 2 CAM indicated that reverifications were not required for Unit 2 pipe supports, the appropriate attributes were validated by the licensee's programmatic backfit and new construction inspection controls.

2.1.1 Findings, Observations, and Results

The inspectors reviewed the selected PCHVP mechanical area attributes, along with the associated attribute evaluation forms (AEFs) and the supporting documentation, in sufficient depth to permit an assessment of the validity of each disposition and to confirm the adequacy of the overall Unit 2 PCHVP

evaluation process. With respect to specific attributes and commodities, additional construction documents and records were requested to validate the detail to which project guidance had been prescribed. Examples of these activities included the "red-lined" as-built drawings, which were requested for the in-core instrument tubing, and a sample of large bore pipe support drawings. The inspectors also interviewed cognizant engineering personnel regarding high strength bolting (e.g., ASTM A-325) practices, skewed T-joint fillet weld design criteria, and piping/support thermal growth clearances and gap dimensions.

With regard to specific questions involving pipe support design controls, the inspectors were informed that all Unit 2 safety-related, large and small bore pipe support drawings (designated as Level 1 drawings per Procedure 2EP-5.05) had been revised prior to the Unit 2 construction restart. Thus, key design input data, obtained by the engineering walkdowns of existing supports, were evaluated and incorporated into the reissued pipe support drawings. While this systematic approach has resulted in accurate drawing and dimensional details for design analysis, the inspectors determined that the current pipe support drawings do not differentiate between as-built data and new design information. Thus, the lack of drawing feature-size differentiation complicates the final quality control (QC) acceptance of pipe supports because of inspection questions regarding the applicability of engineering tolerances versus the as-found construction dimensions. While this situation may result in additional QC information requests to engineering regarding pipe support dimensional data, it was determined that there was no adverse safety impact. Accordingly, the inspectors concluded that the licensee's construction program for the Unit 2 pipe supports appropriately addressed the as-built configuration of existing supports and that this process properly evaluated the available data within the design envelope such that construction completion and QC inspections were based upon accurate information and acceptable engineering detail.

Another specific attribute (748), which was evaluated by the inspectors, involved radial weld shrinkage inspection criteria for large bore pipe welds in thinner walled (i.e., Schedule 80 and lower), stainless steel piping. This issue had initially been identified by the Comanche Peak Response Team (CPRT) on Unit 1, and a 100 percent reinspection of the subject population of pipe butt welds in Unit 1 was conducted to identify any unacceptable radial weld shrinkage conditions. As a result of these Unit 1 reinspections, six nonconforming conditions were identified. All of the resulting nonconformance reports were evaluated by engineering and were accepted without requiring hardware modification. Therefore, based upon these Unit 1 inspection results, the licensee determined that no reverification activities for radial weld shrinkage were required to disposition this PCHVP attribute for Unit 2.

With respect to this issue, an inspection observation was identified involving the licensee's reliance on the Unit 1 reinspection results of radial weld shrinkage rather than performing a selected reinspection of those Unit 2 piping welds with the most potential for base metal shrinkage. Specifically, by not performing a sample reinspection of installed Unit 2 piping

configurations, which were subject to weld shrinkage due to cyclic heat input from multiple weld repairs, the potential exists for excessive radial stress in specific pipe welds associated with large bore, stainless steel butt welded joints.

Based on discussions with the licensee's cognizant engineering organization, it was determined that their evaluations of this attribute were not only based on the Unit 1 reinspection results but also on the commonality of welding procedures and processes between Unit 1 and Unit 2. Accordingly, the licensee determined that additional reinspections of this attribute were not necessary to qualify the suspect Unit 2 weld population or to identify the worst case bounding condition.

In this particular instance, the engineering justification for not performing supplementary reinspections of Unit 2 piping systems for weld shrinkage, based solely on the Unit 1 results, although not unacceptable, may not have represented the worst case conditions for Unit 2. In the absence of specific examples where unacceptable weld shrinkage resulted from multiple weld repairs, no safety concerns were identified. However, as determined by the inspectors, a selected sample of the Unit 2 welds, which were susceptible to this phenomenon would have provided an additional level of assurance with respect to the acceptability of these welds.

2.1.2 Summary of Findings

Notwithstanding the above observation, the inspectors concluded that, in general, the licensee's technical approach and engineering methodologies for dispositioning Unit 2 CAM attributes within the mechanical area has produced satisfactory results and that this process resulted in the appropriate resolution of concerns related to PCHVP technical issues. Furthermore, the licensee's program for the resolution of PCHVP attributes for Unit 2 construction activities represented a well controlled and conservative assessment process, which provided for the detailed evaluation of significant issues which could have adversely impacted Unit 2 hardware quality.

No deficiencies were identified during the evaluations of the mechanical PCHVP attributes associated with the Unit 2 CAM. One observation was identified which involved the reliance on Unit 1 PCHVP results for radial weld shrinkage associated with large bore, stainless steel, butt welded piping.

2.2 Civil Structural Attributes

In the civil-structural area, 84 Unit 2 PCHVP attribute evaluations were examined. A complete listing of the civil/structural attributes which were reviewed is contained in Attachment C of this inspection report. The inspection was primarily focused on determining whether the results and lessons learned from the Unit 1 PCHVP were accurately and conservatively utilized in developing inspection requirements for equivalent Unit 2 attributes.

The inspection included review of the licensee's AEFs along with any referenced documentation, including nonconformance reports, design calculations, significant deficiency analysis reports, special technical issue reports, QC inspection procedures, construction specifications, and design change authorizations (DCAs). Additionally, specific questions and concerns regarding PCHVP attributes were directed to individual contacts assigned by the licensee for each commodity area.

2.2.1 Findings, Observations, and Results

As determined by the inspectors during the review process, although all of the 84 Unit 2 civil-structural PCHVP attributes which were selected for review were procedurally designated "N" for no reinspection on the Unit 2 CAM, the majority of these items had been designated to be inspected under programs separate from the PCHVP. This reinspection process was generally manifested by the licensee redesignating existing structures as "in-progress" construction. Other reinspections involved design and construction engineering walkdowns which were performed to revised specifications and inspection procedures. Thus, the level of reinspection of Unit 2 civil-structural commodities was much higher than that suggested by the PCHVP attribute matrix. The inspectors considered these multifaceted reinspection programs to be significant with respect to establishing confidence in the quality of the Unit 2 civil-structural construction area.

Additionally, for those Unit 2 civil-structural attributes which were not specifically reinspected by PCHVP or by other specified reinspection programs, the inspectors concluded that the licensee had established an appropriate technical basis for accepting these attributes "as-is." Additionally, it was ascertained from this review that the licensee had effectively implemented the lessons learned from Unit 1 to enhance procedures and specifications which were utilized for Unit 2.

During the course of these reviews, the inspectors identified several questions and concerns which were discussed with the licensee's engineering representatives. The more significant of these issues are summarized below.

One concern, which was classified as an observation, involved attribute No. 641, "Identification of NF Equipment Supports." The licensee determined that this attribute did not require reinspection in Unit 2 based on the inspection results of eight NF equipment supports in Unit 1. The inspectors questioned the statistical validity of correlating results between the two units based on such a small sample population. In response to this issue, the licensee acknowledged that no specific guidance had been provided for establishing the minimum or threshold sample size necessary to draw statistical conclusions. With respect to this issue, a formal finding was not identified because this example was apparently isolated and the inspectors considered the subject attribute, identification of NF supports, to be of low safety significance. However, as a result of this observation, the licensee

stated that it would consider providing additional guidance on the validity of statistical correlations in its Procedure ECE 3.26, "Statistical Sampling Plans."

The inspectors also identified a concern regarding the statistical sampling techniques employed to validate attributes associated with the Unit 2 cable tray population. The concern centered on an apparent difference in the statistical acceptance criteria which was used for Unit 1 versus Unit 2. Specifically, the validation of the Unit 2 cable tray commodity was unique in that it was based on previous Unit 2 QC inspections and not on the results of previous inspections in Unit 1. When construction on Unit 2 was suspended in 1988, approximately half of the Unit 2 cable tray hangers had been fully completed, QC verified, and vaulted. The remaining hangers were designated by the licensee's program as either awaiting QC inspection or as requiring modification. As determined by the inspectors, in this instance the licensee performed a sample inspection of QC records for 125 of the completed Unit 2 cable tray hangers and analyzed each relevant attribute to determine whether that attribute required QC inspection for the remaining population of Unit 2 cable tray hangers. Accordingly, for this commodity the licensee established the acceptance criterion that, as long as there were three or fewer nonconformances which could not be dispositioned use-as-is (i.e., rejected conditions requiring rework) for the given attribute, the attribute could be accepted without additional QC inspection of the remaining cable tray population (i.e., those cable tray hangers not completed at the time of the 1988 work stoppage).

The inspectors questioned the 3 in 125 acceptance criterion with respect to the 0 in 60 criterion established by the CPRT inspections, which formulated the basis for the Unit 1 PCHVP. In response to this issue, the licensee stated that the CPRT sampling criteria had never been incorporated into plant procedures. Furthermore, the procedure controlling the Unit 2 cable tray sampling effort, Procedure ECE 3.26, "Statistical Sampling Plans," had been in effect during the Unit 1 PCHVP and had not since been revised with respect to sample size requirements and acceptance criteria.

Additionally, the licensee provided the following information in response to this issue. First, the use of the ECE 3.26 sampling technique in the Unit 2 PCHVP was restricted to the cable tray population. Second, the licensee closely considered each rejectable condition for safety significance regardless of whether the acceptance criteria was exceeded. Third, several cable tray attributes were designated for full reinspection despite having fewer than three rejectable nonconformances. Fourth, the licensee stated that all of the Unit 2 cable tray hangers (including those which will not receive QC inspection) received as-built confirmation by engineering in accordance with Field Verification Method FVM-003, which requires field verification by construction in accordance with installation Specification CPES-S-2005. Based on the inspectors review of the supporting information, it was concluded that this concern was appropriately resolved.

The inspectors questioned the licensee's conclusion that Attribute 1678 (baseplate installation for FP [fire protection] structural steel) did not require reinspection in Unit 2. Three nonconformances associated with minimum baseplate contact area (80 percent contact with concrete) resulted in support rework on Unit 1. Despite the rework, each of the three nonconforming conditions were considered acceptable by the licensee in their as-found condition because the affected supports were attached to multiple baseplates; therefore, the one baseplate which lacked the required surface contact for each support would not have adversely affected the safety function of the support. The licensee concluded that since no rejectable conditions were found in Unit 1, no PCHVP inspection of this attribute was required in Unit 2. The inspectors considered 3 nonconforming conditions out of a sample size of 132 to be potentially significant in that it may have been fortuitous that these conditions had not affected a support attached to a single baseplate. Specifically, a single baseplate support in Unit 2 may have inadequate baseplate contact, which could be a rejectable condition.

In response to this issue, the licensee provided additional documentation which established that all three nonconforming conditions in Unit 1 were associated with angle baseplate attachments for the support of fire hose cabinets. Furthermore, the licensee appropriately demonstrated that the surface contact problems were unique to the particular geometry of the angle baseplate supports and that each fire hose cabinet is supported by three angle baseplate supports. Based on the review of this supplementary information, the inspectors concluded that this concern was appropriately resolved.

2.2.2 Summary of Findings

Based on the review of the sampled attributes, the inspectors concluded that the Unit 2 PCHVP acceptably demonstrated a satisfactory level of quality for commodities in the civil-structural area. The methods used to validate Unit 2 PCHVP attributes were generally commensurate with those used to validate the same attributes in Unit 1, and the documentation associated with the evaluation of each attribute was comprehensive and well-organized. The overall level of effort and the exercise of conservative engineering judgement were viewed as strengths.

No violations or deviations were identified in this area. One observation was identified regarding limitations on the use of data to formulate statistical correlations.

2.3 Electrical Attributes

Relative to the electrical area of the Unit 2 PCHVP, the inspectors evaluated a selected sample of 40 electrical attributes which were derived from the Unit 2 CAM. A complete listing of the electrical attributes which were examined is contained in Attachment D of this inspection report. These evaluations assessed each electrical attribute to determine the effectiveness of the licensee's engineering justification for not performing additional PCHVP hardware reinspections. This evaluation process generally included the

review of associated procedures and specifications, TU Evaluation Forms, corrective action requests (CARs), design evaluations, and other documentation associated with the applicable AEFs. Additionally, detailed discussions were conducted with the licensee's electrical engineering staff to resolve concerns and questions which were identified by the inspectors. As a result of these evaluations, the inspectors concluded that the documentation associated with the Unit 2 electrical PCHVP attributes, which were reviewed, was comprehensive and superior in nature.

2.3.1 Findings, Observations, and Results

In the electrical area, the inspectors examined attributes including thermolag, cable separation, electrical penetrations, cable continuity (in fire detection circuits), transformers, and terminations. Thirty-seven of the electrical attributes which were examined had clear and reasonable engineering justification for acceptance. The acceptance of these attributes was generally based on the licensee's self-identification of deficiencies and rapid enactment of broad based corrective actions which encompassed both units. Based on these reviews, it was noted that the most effective deficiency resolutions were those which involved CARs. Specifically, the CARs which were reviewed identified the deficiency, the root case, and both corrective and preventive actions. The CARs examined were originally written to address Unit 1 deficiencies; however, subsequent to the correction of the Unit 1 issue, the same CAR, which identified a weakness on Unit 1, was revised to provide justification for closure of the comparable condition identified in Unit 2. The inspectors also noted that the revised CARs frequently resulted in the licensee performing increased inspection efforts and additional hardware walkdowns. Accordingly, the inspectors concluded that this methodology for closure was effective.

As a result of detailed reviews of the subject PCHVP attributes, the following items were determined to require additional information in order to establish their acceptability. These attributes were No. 1231, "Main Control Room (MCR) Routing"; Attribute 1425 "MCR Termination Locations"; and Attribute 1427, "MCR Conduit Location and Identification." These attributes involved three fire detection conduits which passed through the control room without terminating. Specifically, these attributes were in question because the Final Safety Analysis Report requires, in part, that "All cables entering the control room terminate in the control room." In response to these issues, the licensee supplied an evaluation which had been developed for Unit 1 to establish the acceptability of this configuration. This evaluation concluded that the subject cables were acceptable because they were low energy (24Vdc), nonsafety-related cables which were totally enclosed in conduits. Additionally, this evaluation stated that these configurations satisfied the separation requirements of Regulatory Guide 1.75 and that the conduits incorporated fire stops at all locations which breached the control room. As determined by the inspectors, this issue was addressed as an exception in the CPSES fire protection program as delineated in Amendment 78 of the Final Safety Analysis Report, Section 9.5. Based on the review of the documentation

associated with this issue and the common control room design for Units 1 and 2, the inspectors concluded that the licensee's methodology for accepting this attribute was appropriate.

2.3.2 Summary of Findings

Within the electrical area, the inspectors concluded that the licensee had effectively implemented the translation of the Unit 1 lessons learned to Unit 2. This conclusion was based on the inspector's review of the supporting documentation which was associated with each of the attributes evaluated. No deficiencies or observations were identified and the inspectors determined that the licensee's justifications for not performing additional PCHVP inspections for Unit 2 were technically acceptable. Also, the increased inspection efforts and additional hardware walkdowns associated with CAR resolutions and the procedural modifications which were implemented for Unit 2 were judged to be a strength. The inspectors also concluded that the licensee had effectively incorporated the lessons learned from Unit 1 into Unit 2.

2.4 Instrumentation and Control

Within the instrumentation and control area, the inspectors reviewed a selected sample of 35 PCHVP attributes which are delineated in Attachment E of this inspection report. During this review process, the inspectors examined the applicable AEFs and the supporting documentation, which typically included specification requirements, installation procedures. calculations, and associated CARs and significant deficiency analysis reports. As a result of this review process, the inspectors determined that the licensee had developed and maintained excellent records and control processes for this activity and that the supporting engineering methodologies were conservative in nature. It was also determined that, although the selected attributes were identified as not requiring PCHVP reinspections, the applicable specifications and installation procedures frequently directed equivalent inspection criteria for the corresponding Unit 2 commodities/attributes.

2.4.1 Findings, Observations, and Results

As a result of this review process, several AEFs were identified which required additional clarification to establish the equivalency of Unit 2 design methodologies. One such example involved Attribute 884 which concerned instrumentation tubing radiation penetration seals. Specifically, this commodity involved the incorporation of radiation penetration seals as supports/restraints into the applicable tubing stress analysis and tubing support design for Unit 2 safety-related tubing systems. Based on the inspectors reviews of selected instrumentation isometric drawings, it was determined that the radiation penetrations were properly incorporated as support restraints; however, the governing Procedure 2EP-5.22, Revision 0, "I&C Tubing Supports Evaluation and Design Criteria," did not specifically delineate this requirement. Subsequent to the identification of this issue,

the licensee's engineering organization responded rapidly and a procedure change notice was issued to incorporate appropriate design considerations for penetration seals into Procedure 2EP-5.22.

With respect to other similar instances which involved Attribute 885, "Instrument Tubing and Fittings (Heat Tracing)," and Attribute 549, "Fire Protection Supply Valve (Position Indicators)," appropriate justifications were provided which established the validated design of these items. However, one observation was identified during this inspection effort which involved the human factors engineering program for the detailed control room board design review (AEFs 1600 and 1604). Specifically, the inspectors determined that the controlling specification for this activity, 2323-MS-605, Revision 3, "Control Boards, Nuclear Safety Related," had not been revised since May 1989. Accordingly, 17 design change notices (DCNs) and one DCA currently exist against this specification. Although there is no procedural requirement to incorporate these outstanding DCNs and DCA (i.e., Procedure ECE 5.02 specifies that revisions to Level S2 Category specifications are at the discretion of the engineering manager), the concern existed that this relatively large number of design changes could result in conflicting information. Subsequent to the identification of this issue the licensee provided additional information which established that this specification was utilized by a limited number of engineering personnel who were familiar with the technical content of the subject design changes. Futhermore, it was determined that this approach, which accumulated design changes for this particular specification, was consistant with the methodology utilized for Unit 1. Based on the inspector's review of the technical justification for this condition and the procedural allowance for not incorporating outstanding design changes, the inspectors concluded that this approach was acceptable.

2.4.2 Summary of Findings

In general, the documentation reviews which were performed within the instrumentation and control area indicated that the licensee's processes for the translation of Unit 1 PCHVP results to Unit 2 construction completion activities were well established and properly implemented and they were commensurate with the methodologies utilized for Unit 1. No deficiencies were identified within the areas examined and strong management support and involvement were evident as indicated by the thoroughness of the AEF packages which were reviewed and the sound technical justifications which were incorporated into the Unit 2 design validation program. One observation was identified involving the relatively large number of outstanding design changes associated with the specification for the control room board design.

3. EXIT MEETING

An exit meeting was conducted on April 20, 1992, with the persons identified in paragraph 1 of this report. The licensee did not identify as proprietary any of the materials provided to, or reviewed by, the inspectors during this inspection. During this meeting, the inspectors summarized the scope and findings of the inspection.

ATTACHMENT A

MECHANICAL AREA ATTRIBUTE IDENTIFICATION NUMBERS

Att. No.	Commodity	Attribute
0492	Fire Protection (FP) Extinguishers	Mounting/Location
0517	FP Halon Equipment	Presence of ID Tags
0522	FP Halon Equipment	Pneumatic Actuator Tubing Securely Attached
0533	FP Hose Cabinet	Orifice Plate Size
0540	FP Pipe & Fittings	Location and Orientation
0551	FP Atmospheric Clean-up Units	Piping Configuration
0582	Incore Instrument Tubing	Dimensions in Accordance with Drawing
0583	Incore Instrument Tubing	Routing - in Accordance with Drawing
0629	Mechanical Equipment	Manway Bolting
0632	Mechanical Equipment	Tornado Rollup Door Free Area
0639	Mechanical Equipment	Dampers/Tornado - ID Number, Size, Location
0646	FP Penetration Seals	Configuration - Internal Conduit Seal Orientation
0651	FP Penetration Seals	Config. - Detail Assigned Per Seal Sch. (M1-1900)
0659	Pipe Support Variable/Constant Springs	Spring Size
0660	Pipe Support Variable/Constant Springs	Stanchion/Spring-Can Free From Binding (F-Type)
0672	Pipe Support Variable/Constant Springs	Constant Support Travel Indications (Settings)
0700	Pipe Support (Cat. II/I)	Support Stability
0704	Pipe Support (Cat. II/I)	Gang Support Interface
0706	Pipe Support (Cat. II/I)	Aircraft Cable Supports Cable Type
0712	Pipe Support (Cat. II/I)	Supports General - Location
0713	Pipe Support (Cat. II/I)	Supports General - Function
0748	Piping and Inline Components	Pipe Welding - Radial Weld Shrinkage (SS)
0762	Piping and Inline Components	Valve-Flow Direction
0771	Piping and Inline Components	Pipe Bends - Final Pipe Wall Thickness
0780	Piping and Inline Components	Eccentric Reducer Orientation
0781	Piping and Inline Components	Relief Valve Size Inlet/Discharge Pipe Control
0782	Piping and Inline Components	Insulation - Material Type
0783	Piping and Inline Components	Insulation - Thickness
0792	Piping and Inline Components	Valve Locking Devices Installation
0793	Piping and Inline Components	Handwheel Installation (Special Cases)
0928	Pipe Support Bolted Connections	Bolt Size
0931	Pipe Support Bolted Connections	Nut Tight
0932	Pipe Support Bolted Connections	Locking Devices Provided (Not for SA-193, Gr. B-7)
0933	Pipe Support Bolted Connections	NF Bolted Connections ≤2 Degree Skew (1:20)
0945	Pipe Support Pipe Clamps	Bolt/Pin Size
0947	Pipe Support Pipe Clamps	Proper Clamp Spacer
0952	Pipe Support Snubbers	Snubber Size
0957	Pipe Support Snubbers	Safety Wire Tight, Crimped, Undamaged
0960	Pipe Support Snubbers	Rear Bracket Size/Orientation
0964	Pipe Support Snubbers	Snubber Pin to Pin Dimension
0967	Pipe Support Welds	Flare Bevel/Fillet Weld Substitution (SMBORE)
0974	Pipe Support General	Clearance - Support Members to Adjacent Pipe Weld
0975	Pipe Support General	Support Location Within Tolerance
0977	Pipe Support General	All Voided & Temporary Supports Removed
0980	Pipe Support General	Dimensions & Config. of Vendor Supplied Components
0981	Pipe Support General	Correct Material

Att. No.	Commodity	Attribute
0990	Pipe Support General	Member Locations
0992	Pipe Support General	Shims Installed Per Drawing Details
0993	Pipe Support General	Span Dimension Between Supports
0995	Pipe Support General	Pipe Clearance - Box Type Frame Support
0997	Pipe Support General	Pipe Clearance - U-Bolt Type Supports
1008	Pipe Support Sway Struts	Spherical Bearings Free to Swivel
1010	Pipe Support Sway Struts	Eye Rod Ends Not Binding
1143	HVAC Ducts (Safety Related)	Flange - Type
1147	HVAC Ducts (Safety Related)	Flange - Bolt Spacing
1163	HVAC Ducts (Safety Related)	Tie Rods - Location
1171	HVAC Ducts (Safety Related)	Welds - Splice Welds Continuous
1175	HVAC Ducts (Safety Related)	Configuration - Gage Thickness
1192	HVAC Ducts (Safety Related)	Gasket Existence All Around
1270	Mech. Remote Valve Operators (Cat II/I)	Supports - Tube Steel Size, Length
1586	Control Valves	Verify Pipe Insul. is not Applied to Valve Actuator Location
1615	Mechanical Equipment	
1621	Mechanical Equipment	Safe Transfer Pathway/Crane Heavy Loads
1633	Piping and Inline Components	Minimum Wall Thickness
1680	Systems Interaction Essential Equipment	Pipe Break Targets Interaction
1793	Pipe Support (Cat II/I)	Increased Load Consideration from BRP Checklist
1795	Pipe Support (Cat II/I)	Excessive Span, Increased Load Consideration
1798	Pipe Support (Cat II/I)	Nut Tightness/Thread Engagement
1799	Pipe Support (Cat II/I)	Config./Orient./Mat.Dev. Affecting Design Adequacy
1800	Pipe Support (Cat II/I)	Total Load Exceeds Existing Support Loads

ATTACHMENT B

MECHANICAL AREA SPECIFICATIONS AND PROCEDURES

Specification No.	Rev. No.	Title
CPES-M-2019	0	Installation, Fabrication, and Inspection Requirements For HVAC Systems, Supports, and Accessories
CPES-M-2017	0	Procurement, Field Fabrication And Erection of Fire Protection Piping
CPES-M-2012	1	Piping And Equipment Installation
CPES-M-2003	1	Field Fabrication And Erection of Piping
CPES-M-1061	0	Fire Rated, Radiation Shielding And Pressure Penetration Shields
CPES-P-2018	0	Field Fabrication And Erection of Piping Supports
CPES-S-2001	2	Structural Embedments
ACP-11.5	11	Component Support Fabrication And Installation
AQP-11.5	09	ASME Component Installation Verification

Procedure No.	Rev. No.	Title
2EP-5.05	2	Preparation and Approval and Control of Project Drawings
2EP-5.12	0	Design Criteria For Pipe Stress and Pipe Supports
2PP-5.25	0	Piping Thermal Growth Test Guideline
2EAP-030	0	Pipe Rupture And Internally Generated Missile Interaction Identification
CPE-IM-PVM-EQ-057	4	Equipment Qualification Walkdowns
DBD-ME 06	0	Control of Heavy Loads At Nuclear Plants
IP-, .4, CP	E	Installation And Repair of 3-6598 Silicon RTV Foam Penetration Seal: C002011270S-Vendor #
52060-P-002	0	Walkdown Criteria Seismic Adequacy Evaluation of Unit 2 Non-Seismic Commodities

ATTACHMENT C

CIVIL-STRUCTURAL AREA ATTRIBUTE IDENTIFICATION NUMBERS

Att. No.	Commodity	Attribute
0020	Cable Tray	Splice Plate Type
0023	Cable Tray	Type/Size
0024	Cable Tray	Location/Routing
0025	Cable Tray	Hung Spacing
0026	Cable Tray	Misdrilled Holes
0042	Cable Tray	Edge Distance-Field Drilled Holes
0043	Cable Tray	Gap at Splice Plates
0045	Cable Tray Hanger	Concrete Anchorage Spacing Requirements
0047	Cable Tray Hanger	Clamps Welded-Gaps
0053	Cable Tray Hanger	Hilti Bolts-Projection
0054	Cable Tray Hanger	Welding-Visual Insp. for Location
0067	Cable Tray Hanger	Richmond Anchors-Tightening
0075	Cable Tray Hanger	Configuration/Dimensions
0081	Cable Tray Hanger	Bearing-Nuts/Washers
0085	Cable Tray Hanger	Hilti Bolts-Bolt Size and Type
0087	Cable Tray Hanger	Hilti Bolts-Washer
0092	Cable Tray Hanger	Richmond Anchors Size
0150	Concrete Anchorage Embedded Bolts	Min. Spacing-To Grouted Bolts
0164	Concrete Anchorage Embedded Steel	Strip Plate Attachment Spacing
0187	Conduit Supports	Bolting Material
0196	Conduit Supports	Bolting Configuration as Per Design Drawing
0207	Conduit Supports	Washer (Bevel Orientation)
0210	Conduit Supports	Hilti Bolt Type (Regular/Super)
0223	Conduit Supports	Insert - Thread Engagement
0226	Conduit Supports	Distance and Location of Loads on Member
0240	Conduit System	Identification
0241	Conduit Supports	Size (Diameter)
0245	Conduit System	LBDs (Size and Location)
0247	Conduit System	EC (Size/Location)
0252	Conduit System (CSRs Only)	Cable Angle (Multi Conduit)
0253	Conduit Supports	Studs-Diameter
0258	Conduit System	Pull Sleeve (Size and Location)
0284	Conduit System	Junction/Pull Box - Type (Supported/Unsupported)
0301	Conduit Train C (2" diameter and less)	Presence of Reamed Clamp
0332	Containment Liner General Welding	Stud Weld Installation
0641	NF Equipment Supports	Identification
0729	Pipe Whip Restraints	Bolts - Shimming
0740	Pipe Whip Restraints	Welding-Location (AWS & NF)
0827	Mech.Rotating/Reciprocating Equip.Anchorage	Hilti Bolt - Torque Seal
0834	Structural Steel General	Welding-Undercut
0840	Structural Steel General	Base Plate Installation
0849	Structural Steel Bolting	Verify Bolt and Nut Material, Bolt Diameter
0927	Pipe Support Concrete Anchorage-Embedded Bolts	Locking Devices
0929	Pipe Support Bolted Connections	Washers/Hardened Washers
0936	Pipe Support Hilti Bolts	Final Minimum Embedment
0985	Pipe Support General	Shear Lug Alignment/Relative Circumferential/Axial Dev.

Att. No.	Commodity	Attribute
1001	Pipe Support General	Orientation - Structural Support Members
1002	HVAC Duct Supports	Concrete Anchorage - Spacing within Plate
1108	HVAC Duct Supports	Hilti Bolt Skew - 6 Degr Maxim...
1114	HVAC Duct Supports	Richmond Inserts - Sn ght Bolting
1125	HVAC Duct Supports	Configuration - Member ...hape
1127	HVAC Duct Supports	Configuration-Plumb, Levelness and Skewness
1141	HVAC Duct Supports	Welds - Location
1274	Mechanical Remote Valve Operators (Cat II/I)	Supports - Weld Location
1332	Mechanical Remote Valve Operators (Cat II/I)	Concrete Anchorage Richmond Inserts Bolt Engagement
1333	NF Equipment Supports	Concrete Anchorage Richmond Inserts Bolt Engagement
1404	HVAC Duct Supports	Damage - Physical and Base Metal
1441	Pipe Support Concrete Anchorage-Rich.Ins.	Exposed Nuts - Material
1483	Electrical Equipment General	Mounting
1494	Hollow Metal Doors Loc.in FB-Class I Structures	Doors, Frames & Appropriate Hardware Bear UL Fire Label
1505	Bullet/Pen.Resistant Doors Loc.in FB-Class I Struct.	Door Thickness & Door Stop Plate Dimensions Conform to Mfg's Drawings
1520	Rolling Steel Doors in Class I Structure FB	Electrically Opr. Doors: Release of Fusible Link Overrides Electric Operator
1523	Rolling Steel Doors in Class I Structure FB	Fusible Link Configuration
1533	Fire Proofing-Struct.Steel-Class I Structure FB	Thickness of Material per Design Requirements
1534	Fire Proofing-Struct.Steel-Class I Structure FB	Material Configuration per Design
1535	Fire Proofing-Struct.Steel-Class I Structure FB	No Material Delamination
1541	Unit Masonry Const.-Class I Structure FB	Verify Thickness of Barrier per Design Documents
1542	Unit Masonry Const.-Class I Structure FB	No Unrepaired Chips, Cracks, or Holes
1627	Pipe Support Welds	Weld Length for Members Lying Flat on Base Plate
1641	Reinforced Concrete	Gap Dimension Between Concrete Structures & Elements
1651	Structural Steel Bolting	Threads Excluded from Shear Plane
1656	Sys.Interaction Nonsafety Comp/Cnt.I Structures	Seismic/Nonseismic Sources Identification
1673	Cable Tray Hanger	Hilti Bolts-Nut Fully Engaged/No Bottom Out
1678	FP Structural Steel	Base Plate Installation
1696	Conduit Supports	Member Configuration
1703	Instrument & Tubing Supports	Hilti Install-Bolt Properly Set
1711	Instrument Control Valve Accessory Supports	Hilti Install-Nut Engagement
1717	Instrument Racks	Hilti Install-Bolt Properly Set
1729	Mechanical Equipment Supports	Concrete Anchorage Hilti Bolts Anchor Properly Set
1735	Mechanical Equipment Supports	Concrete Anchorage Richmond Inserts Bolt Engagement
1762	Rolling Steel Doors-Class I Structure FB	Expansion Gap
1779	Electrical Equipment General	Concrete Anchorage Rich.Ins.Bolt Thread Engagement
1813	Conduit Supports (CSRs only)	Cable - Size CPE-EB-FVM-CS-014 Scope
1824	Conduit Supports	Insert - Tightness of Bolting Hardware

ATTACHMENT D

ELECTRICAL AREA ATTRIBUTE IDENTIFICATION NUMBERS

Att. No.	Commodity	Attribute
0014	Cable Tray	Fill Above Siderail
0015	Cable Tray	ID Cable Tray with Thermolag
0016	Cable Tray	Color Code for Trays with Thermolag
0017	Cable Tray	Barriers
0101	Cable-Power, Control & Instrument Termination	Coaxial Connector Installation
0103	Cable-Power, Control & Instrument Termination	Bent & Twisted Lugs
0106	Cable-Power, Control & Instrument Termination	Terminal Spade Lug Connectors
0120	Cable-Power, Control & Instrument Termination	Fire Detection-Termination Point
0122	Cable-Power, Control & Instrument	NIS Triaxial-Trained Radius
0130	Cable-Power, Control & Instrument	Cable Pulling Aids Removed
0135	Cable-Power, Control & Instrument	Panel Internal Cable Supports
0147	Cable-Power, Control & Instrument	Fire Detection-Conductor Size & Number
0149	Cable-Power, Control & Instrument	Actual Cable Length
0261	Conduit System	Identification/Color Code with Thermolag
0265	Conduit System	Flex Conduit Bend Radius
0271	Conduit System	Junction Box - Cover, Hardware, Gaskets
0278	Conduit System	Flex Type
0365	Elec. Equip. 120V AC Dist. Panels & Transfers	Cover & Gasket Installation
0375	Elec. Equip. 125V DC Batteries	Assembly (Rack)
0395	Elec. Equip. 480V Unit Sub.	Field Modification/Rework
0401	Elec. Equip. 6.9 KV SWGR	Assembly
0402	Elec. Equip. 6.9 KV SWGR	Field Modification/Rework
0407	Elec. Equip. Cont. Panels & Racks	Field Modification/Rework
0411	Elec. Equip. Penetration Assembly	Identification
0416	Elec. Equip. Penetration Assembly	Pigtail Support Within 36"
0422	Elec. Equip. Penetration Assembly	Terminations - IR Test
0428	Elec. Equip. Penetration Assembly	Pad Wool Installation
0433	Elec. Equip. Elec. Cond. Seal Assembly	Damage
0437	Elec. Equip. Limitorque Valve Operators	Splice Identification
0440	Elec. Equip. Cont. Panels & Racks	Conduit Entry - Configuration
1231	Cable-Power, Control & Instrument	Main Control Room Routing
1424	Cable Tray Hanger	Clamps - Formerly Inaccessible
1425	Cable-Power, Control & Instrument	MCR Termination Locations
1427	Conduit System	MCR Conduit Location & Identification
1473	Electrical Equipment General	Equipment Identification
1483	Electrical Equipment General	Mounting
1574	Cable-Power, Control & Instrument	Cable Phase Arrangement (Power)
1575	Cable-Power, Control & Instrument Termination	Termination - Screw Tightness
1577	Cable-Power, Control & Instrument Termination	Number of Wires at Termination
1590	Electrical Equipment General	Fuse Size, Type, Manufacturer

ATTACHMENT E

INSTRUMENTATION AND CONTROLS AREA ATTRIBUTE IDENTIFICATION NUMBERS

Att. No.	Commodity	Attribute
0359	Control Valves	Accessories - Configuration
0501	Instrument Flexible Hoses	Bulging Braid
0508	Instrument Flexible Hoses	Twist/Torsion
0509	Instrument Flexible Hoses	Configuration
0549	Fire Protection Supply Valves	Presence of Valve Position Indicator
0574	Instrument Control Valve Accessory Supports	Bolts & Nuts - Grade
0579	Instrument Control Valve Accessory Supports	Configuration
0593	Instrument Racks	Bolting - Grade
0598	Instrument Racks	Configuration Dimensional Tolerance
0796	Instruments	Location - Elevation
0797	Instruments	Location - Plan
0858	Instrument & Tubing Supports	Location/Placement
0861	Instrument & Tubing Supports	Bolting - Torque
0863	Instrument & Tubing Supports	Bolting - Spring Nut Properly Engaged
0870	Instrument Tubing, Valves, Fittings	Tubing - Wall Thickness
0871	Instrument Tubing, Valves, Fittings	Valve Manifolds Boltings (Grade, Size, Torque, Type)
0873	Instrument Tubing, Valves, Fittings	Span Between Supports
0874	Instrument Tubing, Valves, Fittings	Bends Greater Than 45 Degrees
0878	Instrument Tubing, Valves, Fittings	Damage
0880	Instrument Tubing, Valves, Fittings	Thread Sealant - Teflon
0884	Instrument Tubing, Valves, Fittings	Radiation Penetration
0885	Instrument Tubing, Valves, Fittings	Heat Trace Installation Location
1257	Instrument Racks	Spring Nut Alignment
1436	Instruments	Bolting - Size & Number
1487	NAMCO Limit Switches	Configuration
1491	NAMCO Limit Switches	Termination Identification
1595	Instrument & Tubing Supports	Damage
1597	Instrument & Tubing Supports	Bolting - Angularity
1600	Instrument Main Control Board & Panel	Control Equipment - Location
1604	Instrument Main Control Board & Panel	Unique Identifier Per Reg. Guide 1.97
1605	Instrument Racks	Damage
1611	Instruments	Damage
1685	Instrument Flexible Hoses	3-D Clamp Placement
1826	Instruments	Identification - Tag Numbers
1827	Instruments	Design - Support Configuration